DOCUMENT RESUME

ED 461 420 PS 030 119

AUTHOR Lynch, Paul J.; Gentile, Douglas A.; Olson, Abbie A.; van Brederode, Tara M.

TITLE The Effects of Violent Video Game Habits on Adolescent Aggressive Attitudes and Behaviors.

PUB DATE 2001-04-00

NOTE 14p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (Minneapolis, MN, April 19-22, 2001).

PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS Academic Achievement; *Adolescent Attitudes; *Adolescent Behavior; *Adolescents; *Aggression; Hostility; Mass Media Effects; Parent Child Relationship; Predictor Variables; Risk; Teacher Student Relationship; *Video Games; Violence

ABSTRACT

Video games have become one of the favorite activities of children in America. A growing body of research links violent video game play to aggressive cognitions, attitudes, and behaviors. This study tested the predictions that exposure to violent video game content is: (1) positively correlated with hostile attribution bias; (2) positively correlated with arguments with teachers and physical fights; (3) negatively correlated with school performance; and (4) positively correlated with hostility. Participating in the study were 607 eighth and ninth graders from 4 schools. Each prediction was supported. Youth who exposed themselves to greater amounts of video game violence saw the world as a more hostile place, were more hostile themselves, got into arguments with teachers more frequently, were more likely to be involved in physical fights, and performed more poorly in school. Video game violence exposure was a significant predictor of physical fights even when respondent sex, hostility level, and weekly amount of game play were statistically controlled. The findings suggest that video game violence is a risk factor for aggressive behavior and that parental involvement in video game play may act as a protective factor for youth. Results support the framework of the General Aggression Model. (Contains 3 tables and 33 references.) (Author/KB)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 461 420

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
DOUGLAS A. GENTILE
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

The Effects of Violent Video Game Habits on Adolescent Aggressive Attitudes and Behaviors

Paul J. Lynch, University of Oklahoma Medical School;
Douglas A. Gentile, National Institute on Media and the Family[1];
Abbie A. Olson, University of Minnesota;
Tara M. van Brederode, University of Minnesota Institute of Child Development

PS030119

BEST COPY AVAILABLE

The Effects of Violent Video Game Habits on Adolescent Aggressive Attitudes and Behaviors

Paul J. Lynch, University of Oklahoma Medical School;
Douglas A. Gentile, National Institute on Media and the Family[1]*;*
Abbie A. Olson, University of Minnesota;
Tara M. van Brederode, University of Minnesota Institute of Child Development

Paper presented at the Biennial Conference of the
Society for Research in Child Development (April, 2001),
Minneapolis, Minnesota

Abstract

Video games have become one of the favorite activities of children in America. A growing body of research links violent video game play to aggressive cognitions, attitudes, and behaviors. This study tested the predictions that exposure to violent video game content is (1) positively correlated with hostile attribution bias, (2) positively correlated with arguments with teachers and physical fights, and negatively correlated with school performance, and (3) positively correlated with hostility. 607 8th- and 9th-grade students from four schools participated. Each prediction was supported. Youth who expose themselves to greater amounts of video game violence see the world as a more hostile place, are more hostile themselves, get into arguments with teachers more frequently, are more likely to be involved in physical fights, and perform more poorly in school. Video game violence exposure is a significant predictor of physical fights even when respondent sex, hostility level, and weekly amount of game play are statistically controlled. It is suggested that video game violence is a risk factor for aggressive behavior. The results also suggest that parental involvement in video game play may act as a protective factor for youth. Results are interpreted within and support the framework of the General Aggression Model.

PS 030119

[1] Address correspondence to: Douglas A. Gentile, Ph.D., National Institute on Media and the Family, 606 24th Avenue South, Suite 606, Minneapolis, MN 55454. Phone: 612/672-5437; Fax: 612/672-4113; E-mail: dgentile@mediafamily.org

The Popularity of Video Games

Video games have become one of the favorite activities of children in America (Dewitt,1994). Sales have grown consistently with the entire electronic entertainment category taking in between $7 billion and $7.5 billion in 1999, surpassing theatrical box office revenues for the first time ("Come in and Play," 2000). Worldwide video game sales are now at $20 billion (Cohen, 2000). Over 100 million Gameboys and 75 million PlayStations have been sold (Kent, 2000). The average American child between the ages of 2 and 17 plays video games for 7 hours a week (Gentile & Walsh, under review). A study by Buchman and Funk (1996) highlighted the differences between boys and girls, reporting that fourth through eighth grade boys played video games for 5 to 10 hours a week while girls played for 3 to 6 hours a week.

Using industry polls, Provenzo (1991) studied the most popular Nintendo video games in America and found that 40 of the 47 had violence as their main theme. In another study (Buchman & Funk, 1996) in which video games were split into six categories, human and fantasy violence accounted for about 50% of children's favorite games, with sports violence contributing another 16-20% for boys and 6-15% for girls.

Research On Video Games and Aggression

Many observant parents agree that the effects of violent video games are probably deleterious to children; however, they generally believe that their own children will be unaffected. This may just be bias on their part, or they may be correct. Research has shown that not all children are affected in the same way by violent video games (Anderson & Dill, 2000; Lynch, 1994; Lynch, 1999). While the literature connecting video game violence and aggression is growing, much of the research that has been done on video games to date has not taken into consideration the effect of pre-existing hostility or aggression.

Several correlational studies (e.g., Anderson & Dill, 2000; Colwell & Payne, 2000; Dominick, 1984; Lin & Lepper, 1987; Fling, Smith, Rodriguez, Thornton, Atkins, & Nixon, 1992) have investigated the effects of video game habits and found a positive correlation between video game habits and an increase in aggressive behavior. However, few studies have differentiated between violent and non-violent video games. Fewer still have looked at differences in the subjects' pre-existing hostility or aggression.

A growing number of experimental studies (e.g., Cooper & Mackie, 1986; Silvern & Williamson, 1987; Schuttte, Malouff, Post-Gorden, & Rodasta, 1988; Irwin & Gross, 1995; Anderson & Dill, 2000) have shown support for the hypothesis that violent video games lead to an increase in laboratory aggression. A meta-analytic study (Anderson & Bushman, in press-a) found that, across 54 independent tests of the relation between video game violence and aggression, involving 4,262 participants, the average effect size was both positive and significant.

The General Aggression Model

The General Aggression Model (GAM) and its relation to violent video games has been described by Anderson and Dill (2000). The GAM seeks to explain aggressive behavior in children after playing violent video games. This model describes a "multi-stage process by which personological (e.g., aggressive personality) and situational (e.g., video game play and provocation) input variables lead to aggressive behavior. They do so by influencing several related internal states and the outcomes of automatic and controlled appraisal (or decision) processes" (Anderson & Dill, 2000, p. 773).

The GAM is relevant to the study of violent video games for several reasons. One reason is that it differentiates between short and long term effects of video game violence on the game-player. With regard to the short-term effects of violent video games, the GAM predicts that both kinds of

input variables, person and situation, can influence the present internal state of the person. The GAM further describes the internal state of a person with cognitive, affective, and arousal variables. Summarizing the GAM's predictions for the effects of violent video games on children's behavior, Anderson and Dill drew the following conclusions: "Short-term violent video game increases in aggression are expected by [the model] whenever exposure to violent media primes aggressive thoughts, increases hostile feeling, or increases arousal" (Anderson & Dill, 2000, p. 774).

The GAM describes the long term effects of violent video games as a result of the development, over-learning, and reinforcement of aggression-related knowledge structures. These knowledge structures include vigilance for enemies (i.e., hostile attribution bias), aggressive action against others, expectations that others will behave aggressively, positive attitudes towards the use of violence, and the belief that violent solutions are effective and appropriate. Repeated exposure to graphic scenes of violence is also postulated to be desensitizing. Furthermore, it is predicted that long term game-players become more aggressive in outlook, perceptual biases, attitudes, beliefs, and behavior than they were before the repeated exposure.

Two studies were conducted to test the efficacy of the GAM in predicting aggression from violent video game play (Anderson & Dill, 2000). In the first study, it was found that real-life video game play was positively related to aggressive behavior and delinquency (long-term effects). The relationship was stronger for individuals who were characteristically aggressive. In addition, amount of video game play was negatively related to school performance. In the second study, laboratory exposure to a graphically violent video game increased aggressive thoughts and behavior (short-term effects), although there was no moderating effect of hostility (i.e., aggressive personality). Both of these studies were consistent with the main hypotheses regarding the GAM and video game violence.

Lynch's research on the physiological effects of violent video games (Lynch, 1994; Lynch, 1999) lends further credibility to the GAM. Lynch's results are consistent with a recent meta-analysis of seven independent tests showing that blood pressure and heart rate increase with exposure to violent video games (Anderson & Bushman, in press-a). This research demonstrates that hostility in adolescence is directly related to physiological reactivity to violent video games. It also demonstrates the efficacy of the GAM for predicting arousal measures, one of the three internal states described by the GAM that may lead to aggression.

The GAM also predicts that long-term effects of violent video games will appear in a number of other areas, including hostile attribution bias, desensitization, and aggressive behaviors (such as physical fights). Children who tend to interpret ambiguous social cues as being of hostile intent (i.e., have a hostile attribution bias) are hypothesized to be more aggressive. This hypothesized relationship has been confirmed consistently across a wide range of samples ranging from early childhood through adulthood, and across a number of studies (e.g., Crick & Dodge, 1994; Dill, Anderson, Anderson, & Deuser, 1997). Furthermore, there is a robust relationship between hostile attribution bias and children's social maladjustment, such as depression, negative self-perceptions, and peer rejection (Crick, 1995).

Based on the GAM, we predict that long-term exposure to violent video games (or other violent media) may create a predisposition to interpret others' actions as having malignant intent. Following this logic, if children come to have a greater hostile attribution bias from repeated, extended exposure to violent video games over time, it is also likely that they would become engaged in more aggressive behaviors such as arguments and physical fights.

The current research is designed to test four hypotheses. First, video game violence exposure is positively correlated with seeing the world as a more hostile place (hostile attribution bias). Second, video game violence exposure is positively correlated with arguments with teachers and physical fights, and is negatively correlated with academic performance. Third, trait hostility will

BEST COPY AVAILABLE

be positively correlated with video game violence exposure. Fourth, limiting the amount of violent video game play, either by self or parent, will be negatively correlated with physical fights and arguments with teachers, and will be positively correlated with academic performance.

Method

Participants

Six hundred and seven 8th (N = 496) and 9th grade (N = 111) students participated in the study. Three surveys were removed for failure to follow instructions, leaving a total sample size of 607. Students were recruited from four Midwestern schools, including one urban private school (N = 61), two suburban public schools (N = 350), and one rural public school (N = 196). Students were recruited from mandatory classes within their schools. The mean age of respondents was 14 (sd = 0.64). Fifty-two percent of respondents were male. Eighty-seven percent of the respondents classified themselves as Caucasian. Participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992).

Instruments

Participants completed three survey instruments: (1) a video game habits survey, (2) a hostile attribution survey, and (3) a hostility survey. Each of these is described below.

Video game violence exposure.

The video game habits survey gathered descriptive data about students' habits, attitudes, and knowledge about video games. It asked about how much they play video games, what types of games they play, how much violence they like in video games, and what they know about the video game ratings. In addition, the survey contained a number of items about "addiction" to video games, other media use (e.g., music, TV), and demographic characteristics. The survey was pretested with 143 7th through 12th grade students.

Similar to Anderson & Dill's (2000) approach, participants were asked to name their three favorite video games. For each named game, participants were asked to rate how frequently they played the game on a seven-point verbally anchored Likert scale (1 = "rarely," 7 = "often"). For each named game, participants were also asked to rate how violent the game is on a seven-point verbally anchored Likert scale (1 = "little or no violence," 7 = "extremely violent"). A video game violence exposure score was computed for each participant, by multiplying the frequency of play for each game by its violence, and taking the mean of the three products.

Hostile attributions.

The hostile attribution survey is one used by Crick and her associates (e.g., Crick, 1995; Nelson & Crick, 1999). This instrument is composed of 10 stories, each describing an instance of provocation in which the intent of the provocateur is ambiguous. Participants answer two questions following each story. The first presents four possible reasons for the peer's behavior, two of which indicate hostile intent and two of which reflect benign intent. The second question asks whether the provocateur(s) intended to be mean or not. This survey measures the participant's perception of hostility from the outside world in two categories: physical hostile attribution and relational hostile attribution. These correspond to expressions of physical and relational aggression. In contrast to physical aggression, relational aggression is defined as aggression directed towards harming a social relationship rather than harming a person's body (e.g., spreading rumors, refusing to invite people to parties, etc.).

Trait hostility.

The third instrument used was the Cook & Medley Hostility Scale (Cook & Medley, 1954). This is a commonly-used instrument that reliably measures hostility as a personality trait of the participant. Because the items for the Cook & Medley are taken from the MMPI, some were

inappropriate for young adolescents. The instrument was modified by deleting seven items and by changing the wording of a few items to make them easier for 8th graders to understand. These modifications were based on those made by Matthews and her colleagues (e.g., Woodall & Matthews, 1993).

Procedure

The children's normal classroom teachers were trained to administer the surveys. The teachers administered the surveys during one normal class period. The students were instructed that video games included any games played on computer, video game consoles, on hand-held game devices, or in video arcades. The surveys were completed anonymously.

Results

Only six percent of 8th and 9th graders say they never play video games, and 59 percent report playing at least once a week. As shown in Table 1, the "average" young adolescent spends nine hours playing video games, 25 hours watching television, 21 hours listening to music, and three and one half hours reading for pleasure each week. Males spend significantly more time playing video games each week than females($t(585) = 8.6$, $p < .001$). Males spend more time watching TV each week ($t(593) = 3.3$, $p < .01$). Males spend less time reading for pleasure each week ($t(589) = -2.5$, $p < .05$).

Parents are not heavily involved with their children's video game playing. Only 13 percent of young adolescents say their parents "always" or "often" put limits on the amount of time they are allowed to play video games, while 43 percent say they "never" do. Only 31 percent of young adolescents think that their parents understand the video game ratings system, and only 15 percent say their parents "always" or "often" check the ratings before allowing them to buy or rent video games (53% report that their parents "never" do). Fewer than one in five parents (19%) have ever kept their children from getting a game because of its rating. Eighty-eight percent of respondents own their own games, and 10 percent of these admit that they have games of which their parents would not approve if they knew the content of the games.

When asked how they usually get new games, 65 percent of youth say they get them as gifts, 42 percent buy them with their own money, 33 percent rent them, 31 percent borrow them from friends, and 16 percent download them from the Internet. Overall, 27 percent of youth say they have purchased M-rated ("Mature") games with their own money, although a sizeable percentage (22%) say they do not know whether they have or not. After removing those who do not know, 54 percent of boys and 7 percent of girls say they have purchased M-rated games with their own money.

When asked to rate how much violence they like to have in video games on a scale of one to ten (1 = No violence, 10 = Extreme violence), youth like to have an average of 5.4 (sd = 2.73). There is a wide difference between boys and girls, however. Boys prefer an average of 6.7 (sd = 2.3) and girls prefer an average of 3.8 (sd = 2.3). This difference is significant ($t(551) = 14.2$, $p < .001$). Two-thirds (68%) of boys choose the number six or higher, whereas only 22 percent of girls prefer this much violence in their video games. Only one percent of boys and 16 percent of girls said they like to have no violence (by choosing the number 1) in video games.

Students were also asked how much violence they like to have in video games compared to two or three years ago. In general, appetites for violence tend to stay the same or increase. Among students with a valid response (24% marked "don't know"), 44 percent responded that they like the same amount now, 43 percent like "a little more" or "a lot more," and only 13 percent like "a little

less" or "a lot less." Boys are more likely to say that they like more violence now compared to two or three years ago than are girls (54% and 26%, respectively; $X2 = 39.0$, $df = 4$, $p < .001$).

The Relationship between Media Habits and Aggressive Attitudes and Behaviors

As can be seen in Table 2, video game habits are significantly related to children's hostile attribution scores, the frequency with which they get into arguments with teachers (by self-report), their grades, and their levels of hostility. We have arranged the media habits data into three categories: Amount of Media Usage, Violent Content of Media, and Limits. The data are discussed in that order below.

Amount of media usage.

In general, the more time that young adolescents spend using electronic media, the more likely they are to have a hostile attribution bias. Furthermore, the more time they spend with electronic media, the more likely they are to get into arguments with teachers. Youth who are more hostile also tend to use electronic media in greater amounts.

Students were also asked whether they had been involved in a physical fight within the past year. Students who spend more time playing video games ($t(576) = 5.1$, $p < .001$), have played for more years ($t(581) = 2.9$, $p < .01$), or buy or rent video games more frequently ($t(546) = 4.9$, $p < .001$) are more likely to have been involved in physical fights.

Violent content of media.

As shown in Table 2, exposure to violent content and preference for violent content are correlated positively with hostile attribution, with arguments with teachers, and with hostility. They are negatively correlated with school performance. Furthermore, there is a systematic relationship between violent content and physical fights. Students who expose themselves to more video game violence are more likely to have been involved in physical fights ($t(531) = 7.8$, $p < .001$). Students who like more violence in their video games are more likely to have been involved in physical fights ($t(544) = 9.1$, $p < .001$). Students who like more violence in their video games now than two or three years ago are more likely to have been involved in physical fights ($t(419) = 4.0$, $p < .001$).

We asked students whether they play video games when they are angry as a way to release their anger. Thirty-nine percent of students overall (45% of boys, 31% of girls; $X^2 = 11.8$, $df = 1$, $p < .01$) say they play video games with the intention to release their anger. This usage pattern is related systematically with each of the aggression variables. Students who play video games as a way to release anger see the world as a more hostile place ($t(545) = 3.0$, $p < .01$), get into arguments with teachers more frequently ($t(538) = 2.5$, $p < .05$), tend to be more hostile ($t(537) = 6.7$, $p < .001$), and are more likely to have been involved in physical fights ($X^2 = 19.0$, $df = 1$, $p < .001$). They also perform more poorly in school ($t(529) = 3.0$, $p < .01$).

Limits on media usage.

As shown in Table 2, parental limits are correlated negatively with both arguments with teachers and hostility, and are positively correlated with school performance. Students whose parents check the ratings more frequently before allowing them to buy or rent video games are less likely to have been involved in physical fights ($t(539) = 4.9$, $p < .001$). Similarly, students whose parents put time limits on video game play are less likely to have been involved in physical fights ($t(551) = 2.1$, $p < .05$). Students who sometimes try to limit their own video game playing are less likely to get into arguments with teachers ($X^2 = 20.9$, $df = 3$, $p < .001$), are less hostile ($t(554) = 2.5$, $p < .05$), and are less likely to get into physical fights ($X^2 = 3.9$, $df = 1$, $p < .05$).

Hostility

Students' hostility levels are significantly correlated with their media habits. As shown in Table 2, students who are more hostile tend to use more electronic media, expose themselves to more video game violence, prefer more violent content, and have fewer parental limitations to the content of their video games. In addition, there is a positive correlation between hostility and hostile attribution ($r = .38$, $p < .001$), and between hostility and arguments with teachers ($r = .31$, $p < .001$). Hostility is negatively correlated with grades ($r = -.24$, $p < .001$). As would be expected, males have higher hostility scores on average than females, and students with higher hostility are more likely to have been involved in a fight in the past year.

Exposure to Video Game Violence

Given the amount of intercorrelation among hostility, media habits, sex, and aggression variables (e.g., physical fights), it would be reasonable to question whether video game violence contributes any independent variance to the expressions of aggression measured here. It is certainly possible that hostility is the only factor that matters, and that all other correlations reflect their intercorrelation with hostility. To test this, we conducted logistic regressions predicting physical fights in the past year (dichotomous variable). In the first, we entered hostility (Ho), video game violence exposure (VGV), and their interaction (Ho x VGV) as independent variables. The two main effects were significant independent predictors of fights, although the interaction did not predict a significant amount of variance. These variables predicted 20 percent of the variance in physical fights. Table 3 displays this effect graphically. When Ho and VGV are split into quartiles, an increase in either predicts an increase in the percentage of students who have been involved in physical fights. The students with the lowest hostility (Ho 1) and lowest exposure to violent video games (VGV 1) also have the lowest incidence of physical fights (4%). The highest hostility students (Ho 4) with low exposure to violent video games have relatively low incidence of physical fights (28%). However, the lowest hostility students (Ho 1) who expose themselves to the greatest amount of video game violence (VGV 4) have a higher incidence of physical fights (38%). Sixty-three percent of high hostile (Ho 4) and high video game violence (VGV 4) students have been involved in physical fights.

To provide a stricter test of whether VGV contributes independently to fights, we conducted a logistic regression in which we entered respondent sex, hostility, and amount of video game play per week on step one. On step two, we entered violent video game exposure. It contributed a significant amount of variance even when controlling for sex, hostility, and amount of play. On step three, we entered the frequency with which parents check the ratings before allowing students to purchase or rent games. It also contributed a significant amount of additional variance. These five variables accounted for 21 percent of the variance in involvement in physical fights.

Similar analyses were conducted using hostile attribution as the dependent variable. In contrast to the results discussed above, after controlling for sex, hostility, and weekly amount of video game play, neither VGV exposure nor parent rating checking accounted for a significant additional amount of variance. However, the amount of violence students like to have in video games did contribute a significant amount of independent variance, even controlling for all the above variables (total $R^2 = .12$).

Similar results were found when predicting school grades. After controlling for sex, hostility, and weekly amount of video game play, VGV exposure did not account for a significant additional amount of variance. The frequency with which parents check video game ratings and the preferred amount of violence did contribute significantly, even when the previous variables were controlled statistically (total $R^2 = .17$).

Discussion

Each of the hypotheses was supported by the results of the study. Based on the GAM, it was hypothesized that exposure to video game violence would be positively correlated with hostile attribution bias. This hypothesis was generally confirmed. Hostile attribution bias is correlated significantly with three measures of violent content: the amount of violence adolescents like to have in video games, whether they like more or less violence now compared to two or three years ago, and the amount of video game violence they expose themselves to. Preference for violent content in games was a significant predictor of hostile attribution even when respondent sex, hostility level, and weekly amount of play were statistically controlled. However, controlling for those same variables, video game violence exposure did not contribute a significant amount of additional variance.

It was hypothesized that exposure to video game violence would be positively related to aggressive behaviors, such as arguments with teachers and physical fights. This hypothesis was confirmed. Students who expose themselves to more video game violence are more likely to have been involved in physical fights and get into arguments with teachers more frequently. Furthermore, students who intentionally use video games as a way to release anger tend to be more hostile, are more likely to have a hostile attribution bias, get into more arguments with teachers, and are more likely to have been involved in physical fights than are youth who do not play video games as a way to release anger.

The hypothesis that youth who are more hostile would also expose themselves to more video game violence was also confirmed. This finding raises a "chicken and egg" question. Are young adolescents more hostile and aggressive because they expose themselves to media violence, or do previously hostile adolescents prefer violent media? Due to the correlational nature of this study, we can not answer this question directly. The GAM predicts a bidirectional effect, in which personological variables such as hostility affect media habits, which in turn reinforce and can modify the personological variables. Huesmann and his colleagues have shown in long-term longitudinal studies that early media violence consumption habits predict later aggressive behaviors, but that early aggressive behaviors do not predict later media violence consumption habits (Lefkowitz, Eron, Walder, & Huesmann, 1972, cited in Calvert, 1999). In the present research, video game violence exposure was a significant predictor of physical fights, even when sex, hostility, and weekly amount of video game play were statistically controlled. Table 3 shows graphically that hostility is not the whole story. If it were, then we would expect that children with the lowest hostility scores would not get into physical fights regardless of their video game habits. Under this logic, we would also expect that children with the highest hostility scores would get into physical fights regardless of their video game habits. Yet, low hostile students who have the highest exposure to violent video games are more likely to have been involved in fights than high hostile students who have the lowest exposure to violent video games (38% compared to 28%, respectively).

Some studies have suggested that personality traits such as hostility may moderate or amplify the effects of media violence (e.g., Anderson & Dill, 2000; Lynch, 1994; Lynch, 1999). Indeed, the GAM is designed to accommodate these moderator variables. It is possible that the people who are most affected by violent media are those who are most naturally aggressive, thus putting the most vulnerable at the greatest risk for increased aggression. Few studies have tested this hypothesis, and the results have not been consistent. The present research found no interaction between hostility and exposure to video game violence. Instead, an additive effect was found.

Because of this, we recommend approaching the question of media violence from a risk factors perspective. Clearly, media violence is not the sole cause of aggression. But it is likely that it is one of several causes leading to it. Indeed, the American Psychological Association, American Academy of Pediatrics, American Academy of Child & Adolescent Psychiatry, & American Medical

Association recently issued a joint statement that there is a "causal connection" between media violence and aggressive behavior, but that it is a complex effect (AAP, APA, AACAP, & AMA, 2000). We hypothesize that children with multiple risk factors for violence are more likely to exhibit aggressive behavior. The present data lend support to this hypothesis. Children with high levels of hostility are more likely to be involved in fights than low hostile children. If they expose themselves to more video game violence, their odds of being involved in fights increase even more.

Parent involvement in video game habits appears to act as a protective factor. It was hypothesized that limits to violent video game play would be negatively correlated with fights and arguments, and positively correlated with school performance. This hypothesis was supported. In addition, the present study offers a hint that limiting content may also bring beneficial effects. Students who reported that their parents more frequently checked the ratings before allowing them to buy or rent video games were also less likely to argue with teachers or get into physical fights. In fact, statistically controlling for respondent sex, hostility, weekly amount of video game play, and video game violence exposure, the frequency with which parents check the ratings added a significant amount of predictive power when predicting physical fights. Parents who check the ratings more frequently have children who are less likely to get into physical fights.

The GAM seeks to describe the etiology of aggressive behavior both in the short term and over the long term. The present research does not address any of its short-term predictions, but does provide some support regarding the long-term effects of exposure to violent video games. The pattern of intercorrelation among personological variables (e.g., hostility, preference for violent content), cognitive variables (e.g., hostile attribution bias), and behavioral variables (e.g., arguments and physical fights) is consistent with predictions of the model.

This study is limited by its correlational nature, and strong inferences about causal direction cannot be made. However, these results support the causal theory, and suggest that concern about exposure to violent video games is not misplaced. There is a relationship between video game habits, hostile attribution, aggressive behaviors, and school performance. These results are consistent with the preponderance of other media violence research, the body of video game research, and the predictions from the General Aggression Model. Furthermore, the results of parental involvement are consistent with other research on parental monitoring and limits (both in terms of how few parents monitor or set rules, and in terms of the beneficial effects of such monitoring and limits; e.g., Austin, 1993; Dorr & Rabin, 1995; Huston et al., 1992; Lin & Atkin, 1989; Strasburger & Donnerstein, 1999). Although additional experimental and longitudinal research is clearly needed, it is hoped that youth, parents, and educators can begin to use the results of this research to modify video game habits.

References

American Academy of Pediatrics, American Psychological Association, American Academy of Child & Adolescent Psychiatry, & American Medical Association. (2000) Joint statement on the impact of entertainment violence on children [Web Page]. URL http://www.aap.org/advocacy/releases/jstmtevc.htm

American Psychological Association. (1992). Ethical principles of psychologists and code of conduct. American Psychologist, 47, 1597-1611.

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and life. Journal of Personality and Social Psychology, 78, 772-790.

Anderson, C. A. & Bushman, B. J. (in press-a). Effects of violent games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. Psychological Science.

Austin, E. W. (1993). Exploring the effects of active parental mediation of television content. Journal of Broadcasting & Electronic Media, 37, 147-158.

Buchman, D. D., & Funk, J. B. (1996). Video and computer games in the '90s: Children's time commitment and game preference. Children Today, 24, 12-16.

Calvert, S. (1999). Children's journeys through the information age. Boston, MA: McGraw-Hill College.

Cohen, A. (2000, October 30). New game [PlayStation 2]. Time, 156, 58-60.

Colwell, J., & Payne, J. (2000). Negative correlates of computer game play in adolescents. British Journal of Psychology, 91, 295-310.

Come in and play. (2000). Supermarket Business, 55, 103.

Cook, W. W., & Medley, D. M. (1954). Proposed hostility and parisaic-virtue scales for the MMPI. Journal of Applied Psychology.1954, 38, 414-418.

Cooper, J., & Mackie, D. (1986). Video games and aggression in children. Journal of Applied Social Psychology, 16, 726-744.

Crick, N. R. (1995). Relational aggression: The role of intent attributions, feelings of distress, and provocation type. Development and Psychopathology, 7, 313-322.

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. Psychological Bulletin, 115, 74-101.

Dewitt, P. E. (September 27, 1993). The Amazing video game boom. Time, 67-71.

Dill, K. E., Anderson, C. A., Anderson, K. B., & Deuser, W. E. (1997). Effects of aggressive personality on social expectations and social perceptions. Journal of Research in Personality, 31, 272-292.

Dominick, J. R. (1984). Video games, television violence, and aggression in teenagers, Journal of Communication, 34, 136-147.

Dorr, A., & Rabin, B. E. (1995). Parents, children, and television. In M. Bornstein (Ed.), Handbook of parenting: Vol. 4 (pp. 323-351). Mahwah, NJ: Lawrence Erlbaum Associates.

Fling, S., Smith, L., Rodriguez, T., Thornton, D., Atkins, E., & Nixon, K. (1992). Video games, aggression, and self-esteem: A survey. Social Behavior and Personality, 20, 39-46.

Gentile, D. A., & Walsh, D. A. (under review). A normative study of family media habits.

Huston, A. C., Donnerstein, E., Fairchild, H., Feshbach, N. D., Katz, P. A., Murray, J. P., Rubinstein, E. A., Wilcox, B. L., & Zuckerman, D. M. (1992). Big world, small screen: The role of television in American society. Lincoln, Nebraska: University of Nebraska Press.

Irwin, A. R., & Gross, A. M. (1995). Cognitive tempo, violent video games, and aggressive behavior in young boys. Journal of Family Violence, 10, 337-350.

Kent, S. L. (2000). The First Quarter: A 25-year history of video games. Bothell, Washington: BWD Press.

Lin, C. A. & Atkin, D. J. (1989). Parental mediation and rulemaking for adolescent use of television and VCRs. Journal of Broadcasting & Electronic Media, 33, 53-67.

Lin, S., & Lepper, M. R. (1987). Correlates of children's usage of video games and computers. Journal of Applied Social Psychology, 17, 72-93.

Lynch, P. J. (1994). Type A behavior, hostility, and cardiovascular function at rest and after playing video games in teenagers. Psychosomatic Medicine, 56, 152.

Lynch, P. J. (1999). Hostility, Type A behavior, and stress hormones at rest and after playing violent video games in teenagers. Psychosomatic Medicine, 61, 113.

Nelson, D. A. & Crick, N. R. (1999). Rose-colored glasses: Examining the social information-processing of prosocial young adolescents. Journal of Early Adolescence, 19, 17-38.

Provenzo, E.F. (1991). Video Kids: Making sense of Nintendo. Cambridge, MA: Harvard University Press.

Schutte, N. S., Malouff, J. M., Post-Gorden, J. C., & Rodasta, A. L. (1988). Effects of playing video games on children's aggressive and other behaviors. Journal of Applied Social Psychology, 18, 454-460.

Silvern, S. B., & Williamson, P. A. (1987). The effects of video game play on young children's aggression, fantasy and prosocial behavior. Journal of Applied Developmental Psychology, 8, 453-462.

Strasburger, V. C., & Donnerstein, E. (1999). Children, adolescents, and the media: Issues and solutions. Pediatrics, 103, 129-139.

Woodall, K. L., & Matthews, K. A. (1993). Changes in and stability of hostile characteristics: Results from a 4-year longitudinal study of children. Journal of Personality and Social Psychology, 64, 491-499.

Table 1
Average Amounts of Media Use (Hours/Week)

	Overall Mean	Overall SD	Boys' Mean	Boys' SD	Girls' Mean	Girls' SD
Playing Video Games	9.0	11.9	12.9[c]	13.3	4.9[c]	8.6
Watching TV	25.3	15.4	27.4[b]	16.4	23.2[b]	14.0
Listening to Music	20.7	24.4	18.6	23.3	21.9	23.0
Reading for Pleasure	3.4	4.3	3.0[a]	4.2	3.8[a]	4.4

[a] Means significantly different from each other at $p < .05$.
[b] Means significantly different from each other at $p < .01$.
[c] Means significantly different from each other at $p < .001$.

Table 2
Correlations between Children's Media Habits, Hostile Attribution, Arguments, and Hostility

	Hostile Attribution	Arguments with Teachers	School Grades	Hostility
AMOUNT VARIABLES				
Amount of time playing video games per week	.15[c]	.12[a]	-.25[c]	.20[c]
Amount of years S has played video games	.08[d]	.21[c]	-.21[c]	.10[a]
Lifetime amount of playing video games	.13[c]	.15[b]	-.21[c]	.13[b]
Frequency of buying or renting video games	.15[c]	.18[c]	−.18[c]	.16[c]
Amount of time watching TV per week	.16[c]	.10[a]	-.20[c]	.20[c]
Amount of reading for pleasure	-.10[a]	-.17[c]	.07[d]	-.08[d]
VIOLENT CONTENT VARIABLES				
Amount of exposure to violent video games	.11[c]	.20[c]	-.23[c]	.21[c]
Preferred amount of violence in video games	.21[c]	.25[c]	-.34[c]	.31[c]
Amount of violence preferred compared to 2 or 3 years ago	.23[c]	.16[c]	.16[b]	-.14[b]
PARENTAL LIMITS				
Frequency parents check video game ratings before allowing children to rent or buy games	-.07	-.25[c]	.30[c]	-.16[c]
Frequency parents put limits on amount of time children may play video games	-.04	-.21[c]	.15[b]	-.06

[a] Correlations significant at $p < .05$.
[b] Correlations significant at $p < .01$.
[c] Correlations significant at $p < .001$.
[d] Correlations marginally significant at $p < .08$.

Table 3
Percentage of Students who Have Been Involved in a Physical Fight in the Past Year Split by Hostility and Exposure to Violent Video Games*

	Exposure to Violent Video Games - Quartiles				
Hostility Quartiles	1 - Lowest Exposure	2	3	4 - Highest Exposure	Average
1 - Lowest Hostility	4%	26%	15%	38%	14%
2	16%	33%	27%	58%	31%
3	24%	42%	44%	54%	41%
4 - Highest Hostility	28%	37%	58%	63%	50%
Average	14%	34%	39%	55%	

*Note: Table shows percentage of students reporting involvement in physical fights.